Data System for Living With A Star

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Outline

- What data are needed?

- Format of the database

- Why database software?

- What data should be served to each user?

Solar Activity and the Upper Atmosphere

Variation of solar activity (measured by F10.7) is a major contributor to the variability of the upper atmosphere. Continuous global coverage is necessary to improve our models of this region.

Living With a Star, Data Systems Panel
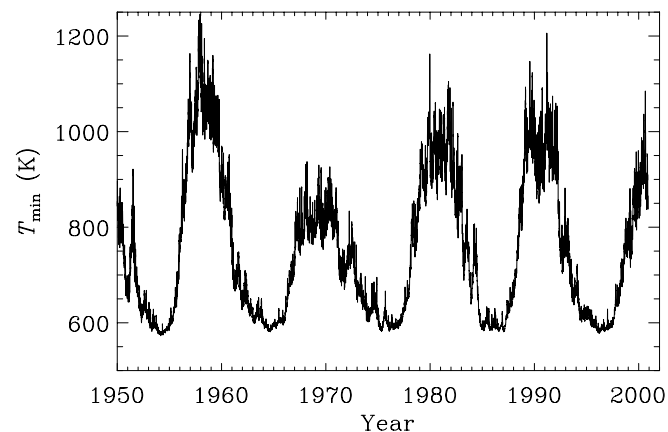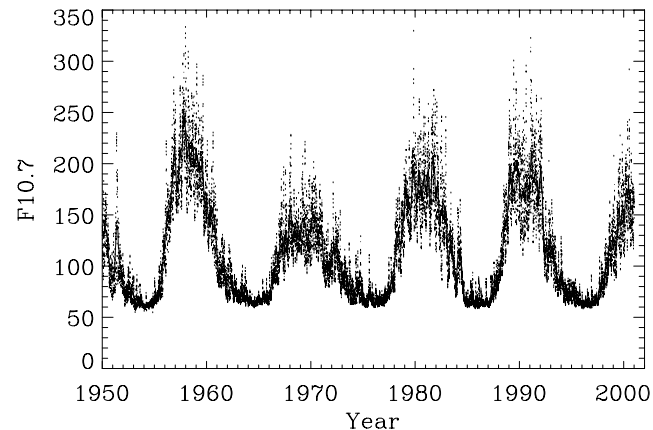
Solar Activity and the Upper Atmosphere

There will always be poor sampling of high levels of solar activity, even in a perfect system.

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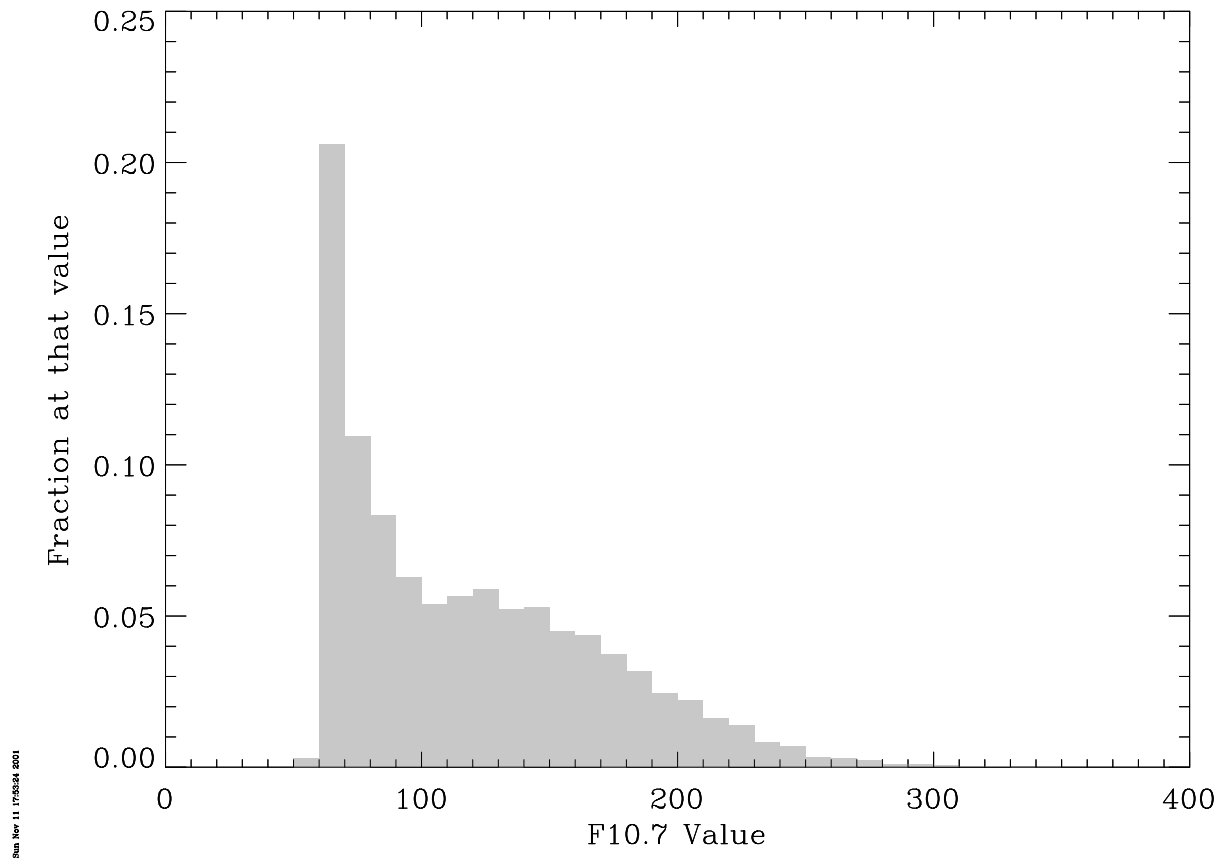
Needed Data Sets

- Altitude profiles of T and N (ion & neutral)

  – Response to changes in solar activity, solar wind, and the magnetosphere

  – Outflows to magnetosphere

  – Instabilities leading to scintillations

  – Assess the response to changes in minor gases (H and CO_2)

- Drivers of the profiles

Data from LWS

- Images, time series, and inverted data
  - All are used in atmospheric sampling
  - Inverted data can be limb or nadir soundings
- Correlation of datasets is valuable
- Assimilated datasets are a longterm goal

Inverted (Limb) Data

- TIMED/SABER (IR radiance $\rightarrow T[P]$, comp.)
  - Produces 30–40 datasets from 10 IR channels
  - Requires a great deal of analysis
    - First guess was 36 hours to invert a day's data
    - Now at 8–12 hours
  - Uses the NCEP assimilated data, UARS climatologies, solar flux models
  - Sampling limited by viewing geometry
  - If interpolated onto fixed grid, you miss the magnetospheric input

Assimilated Data

- Not just models, a data product
- Can provide profiles if single altitude is measured
- Several techniques, one common in weather/climate work
  - Ingests data for a period of time and calculates a model on a pre-determined grid at uniform timesteps
  - "Interpolates" non-uniformly sampled data
  - Used by forecasters to initialize their models

Format of Database

- Wide-Area Archive
  - Multiple sites, possibly redundant
- Large catalog
  - Use a database program to organize, not a directory structure
  - Physical location of data becomes unimportant
- Accurate orbital/attitude data must be readily available
- Heuristic metadata

Database Software

- Anyone can write search software
- Bring in the experts
  - Free software exists
  - Speed is always a problem
    - Different levels of searching
    - Updating the pointers takes time, reduces access

Heuristic Metadata

- Metadata need not be static
  - Successful links should be accumulated in the catalog
- Examples of using a database program
  - Introducing metadata into "discovered" datasets
  - Upgrade the metadata of archived datasets
  - Updating takes place as new data is ingested and successes are noted by trusted users

Data Service

- Does it make sense to serve all data to all people?
- Can subsets be provided to a general class of users, with more depth to experienced users.
  - Why provide msec sampling to someone who needs hour-averaged data? (DEUA & AEUA)
- Definition of levels for ease of interpretation
  - Virtual levels are available

Levels

- EOS defines levels of data
  - Level 0: Raw data
  - Level 1: Raw data with meaning
  - Level 2: Useful to an experienced user
  - Level 3: Useful to a general user
- LWS must address how science-value-added data is reduced and archived